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ABSTRACT

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit is designed for a ninth-grade Home Economics class. Included are five lessons. Most activities relate to energy use. Each lesson includes the concept of the lesson, materials needed, notes to the teacher, and procedure. (RH)

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WILDER PAK

LIVING TODAY WITH AN EYE TOWARD TOMORROW

by Lou Wilder

A ninth grade Home Economics Environmental Learning Experience (ELE) dealing with the conservation aspect of micro wave cooking. One of many "ELE Paks" available for all areas.

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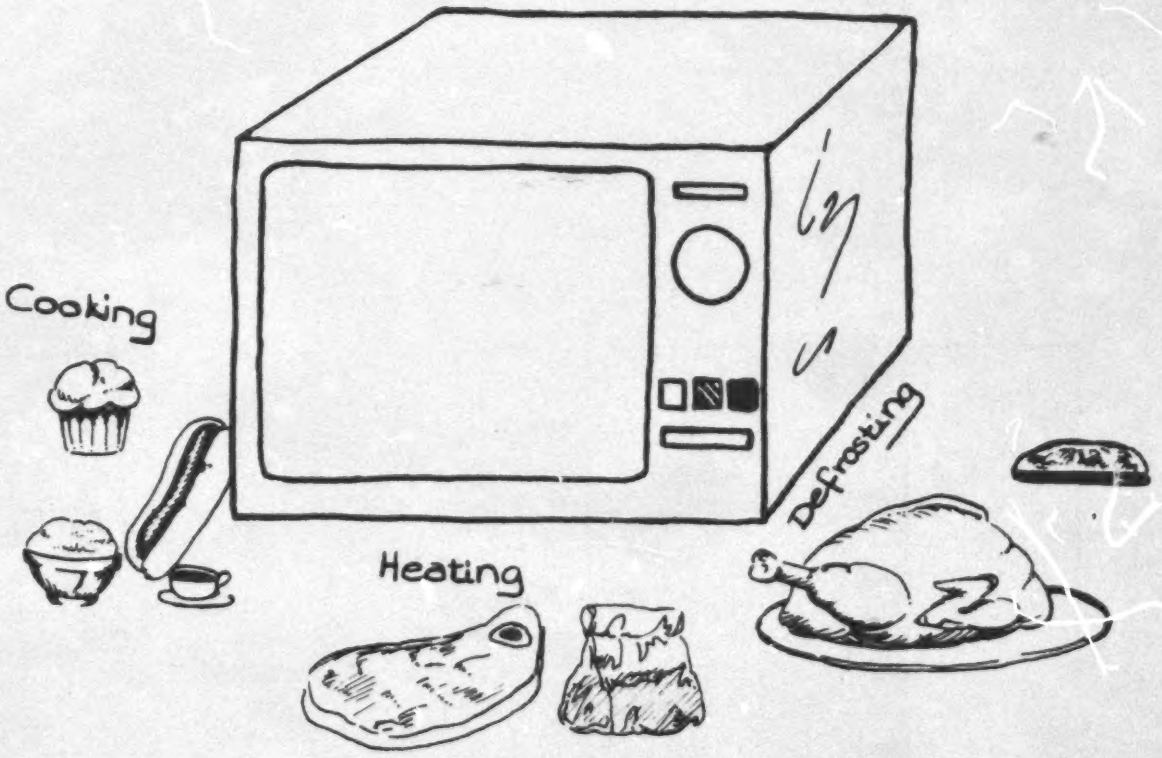
SE 021 440

NOTES TO THE TEACHER

Living today with an eye toward tomorrow. Preparing food in ¼ the time using a microwave oven.

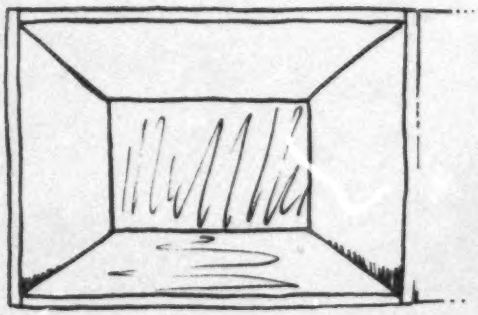
A two week unit in food preparation which will focus on the conservation of energy - electrical, gas/natural, gasoline and human.

The Microwave Oven



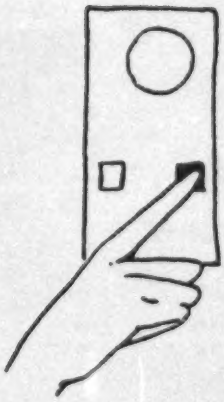
Microwaves are a part of your life. They produce the sound and picture in your radio and TV set. In a microwave oven they create heat in food by causing the molecules to vibrate at a very rapid rate. Because the heat is in the food itself, the oven always stays cool. You cook in your serving dishes or even on paper plates.

WATTS WITH A MICROWAVE OVEN?

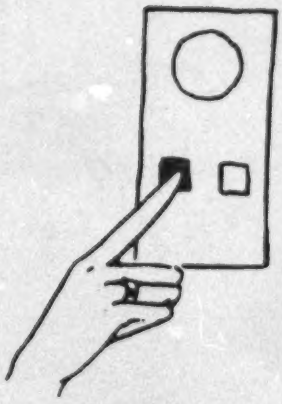


THE INNER SURFACE OF THE OVEN ALWAYS STAYS COOL, SPATTERS AND SPILLS WON'T BAKE ON, THUS THE OVEN IS EASY TO CLEAN. THE NON-POROUS ACRYLIC SURFACE CLEANS WITH A FEW SWIPES OF A DAMP CLOTH - AND NEEDS NO SEPARATE CLEANERS.

STEP 1 - SET THE TIMER FOR RECOMMENDED AUTOMATIC DEFROSTING TIME.



STEP 2 - PRESS THE "DEFROSTER" BUTTON



STEP 3 - PRESS THE "COOK" BUTTON

LESSON 1

CONCEPT: Man and his relationship to energy conservation.

MATERIALS:
Microwave oven
Conventional oven
Pyrex - Corning ware shallow casseroles - paper plates
Miscellaneous spoons, rubber scraper, can opener, paring knife
Wieners, hot dog buns, mustard, relish
Meter monitor
Electromagnetic spectrum chart
X ray film
Radio
Minute minder timer

NOTE TO TEACHER: The purpose of this lesson is to introduce the students to the microwave oven and it's use. Primarily, the amount of electrical energy it uses and the time allocation for cooking. There should be a simplified explanation of microwaves using charts and overhead graphics. The student should have a general understanding of the concept.

PROCEDURE:

1. Explain the wall charts of the electromagnetic spectrum showing the different wave lengths.

   a. Compare radio waves with x rays - ultraviolet, etc.

   b. Listen to radio waves. Have an AM/FM radio. Briefly switch dial back and forth. Have students listen to radio waves.

   c. Show an X-ray film and explain how a radiologist was able to take a picture of bones inside the human body.

2. Put a wiener inside a bun - place on paper plate or paper napkin. Cook in microwave oven for 45 seconds.

   Question: Let's compare - findings?

3. Cook a wiener and bun in conventional electric oven.

4. Cook a wiener in boiling water on an electric hot plate or range.

5. Heat the bun in traditional oven.

NOTE:

1. Have students keep accurate record of the three experiments on the data sheet.

   Questions:
   A. Which method took the longest?
   B. Which took shortest?
   C. Which took the greatest amount of human energy?
   D. Which used resource other than electrical energy? (Water to boil)

2. Choose three students to perform the above experiments, individually preparing a quantity of the product (wieners and buns) so that there will be enough for the entire class to taste-test a product from each method. Plan 1/3 wiener per student for each method...thus the teacher could buy one wiener per person plus the first demonstration by the teacher.

   A. Serving should be done in an orderly manner. Each one of the three "cooks" should arrange their finished products attractively on paper plates and place them on a central table. Students need to see all three products at one time for comparison purposes. Accompaniments such as mustard, catsup and relish may be served with the product but are not essential.

3. At one end of the serving table, evaluation sheets should be made available. This should include:

   Sample Data Sheet

   Circle your answer

i.	The most moist wiener was cooked by:	a. microwave oven b. boiling c. electric oven
ii.	The driest wiener was cooked by:	a. microwave oven b. boiling c. electric oven
iii.	The most desirable bun was:	a. heated in microwave oven b. electric oven
iv.	The internal temperature was hottest in the one cooked:	a. microwave oven b. electric oven c. boiling

4. While the experimental team is performing the rest of the class could work in pairs to determine additional experiments to be performed in class.

   A. They should consider:
      i. How much time will it take?
      ii. How many people can it involve?
      iii. How much will it cost? per class?
      iv. Is a preparation day needed?
      v. List of equipment necessary?

NOTE: The three "cooks" should collect the evaluation sheets, tabulate the results and report the findings as follows:

   i. preferred method
   ii. time factor for preferred method
   iii. comparative amount of energy for each method.

The class should discuss the results of the experiment. From the discussion the students could propose additional meal patterns that could be prepared in the microwave oven.

Teacher could set cost limitation for their plan. Students would need to work out human energy - time and utensils needed.

LABORATORY ACTIVITY EXPERIENCE

MICROWAVE LABORATORY EXPERIENCES TO COMPARE

Traditional oven cooking - with microwave cooking

"Carmel Biscuit Ring-A-Round"

MATERIALS:

One-half pound butter or margarine
1 pkg. dark brown sugar (1 pound)
1 1/3 cups chopped nuts
4 cans refrigerated biscuits
glass casseroles (2 or 4 - depending on class size)
paper or styrofoam cups
instant cocoa
2 qt. saucepan

See Amana Cookbook attached to microwave oven for procedures or sheet titled "The Exciting World of Micro Wave Cooking".

PROCEDURE:

1. Divide the class into four groups. Assign two groups to use conventional oven and two groups to use microwave oven.

2. In order to maintain efficiency in the kitchen, the students should use the problem solving procedure.

   a. When they have identified the problem, in this case to make "Carmel Biscuit Ring-A-Round," then they should get organized.

   b. Make a plan sheet - Assign management system - self instruction tasks to be done with time schedules

      1) include cook, cook assistant, clean up
      2) have time and motion evaluator

3. The cook will do the actual mixing, etc. Assistant cook can chop nuts, gather all ingredients.
   Optional - If the teacher would like to use the final product as a party type project, the assistant cook could make instant hot cocoa. Enough for the people in the group. Then a table setting of paper towel placemats, paper napkins, styrofoam cups or paper cups could be used. What consumes more power? Washing the dishes or manufacturing the product? The clean up team could do the table setting.

NOTE TO TEACHER:

This provides an excellent opportunity to discuss briefly, table manners, and the how-to-do of serving food correctly.

4. Serve the "Carmel Biscuit Ring-A-Round"

   NOTE: The groups using the microwave oven will be ready first so should go ahead and serve and eat, or if each student is to taste both methods, wait for the other group.

Caramel Biscuit Ring-A-Round

3 Tbsp. Butter
1/3 Cup Dark Brown Sugar
1 Tbsp. Water
1/3 Cup Chopped Nuts
1 Can Refrigerated Biscuits (8 - 9½ oz.)

In 1 quart round casserole cook butter, brown sugar and water for 1 minute. Stir in nuts. Cut biscuits into quarters. Stir into caramel mixture. Push biscuits away from center of dish. Insert small juice glass in center. Cook 3½ to 4 minutes. Let stand 1 minute. Remove glass and invert onto serving dish.

Oriental Stir-Fried Steak

1 lb. Sirloin Steak, cut in thin strips
1 Cup Sliced Fresh Mushrooms
1/5 Cup Sliced Green Onions
1 Can Bamboo Shoots, drained
2 Tbsp. Soy sauce
2 Tbsp. Sherry (or water)
1/2 Tbsp. Sugar

Combine meat, soy sauce, sherry and sugar. Let stand at least 30 minutes. Preheat microbrowner 6 minutes. Drain meat on paper toweling; reserving marinade. Put bamboo shoots into marinade. Put meat on hot microbrowner. Stir once. Add mushrooms and green onions: cook three minutes. Stir and add bamboo shoots with reserved marinade. Heat 1 minute longer.

Choco-Date Cake

3/4 Cup Butter
1 Cup Sugar
2 Eggs
1-3/4 Cup Flour
1 Tbsp. Cocoa
3/4 tsp. Soda
1/2 tsp. Salt
1 tsp. Vanilla
3/4 Cup Water
1 Cup Chopped Dates
1 Cup Chocolate Chips
1/2 Cup Chopped Nuts

Soften butter (30 sec) add sugar and eggs. Add the rest of the ingredients except chocolate chips and nuts. Mix well. Spread in 12 x 7 baking dish. Sprinkle with the chips and the nuts. Cook on defrost 5 minutes. Cook 7-8 minutes till done.

5. Evaluation: Each group needs to evaluate the product keeping in mind the following:

   1. Time for preparation
   2. Time for cooking
   3. Quality of product
   4. Amount of energy used.

6. Following day class should discuss the use of microwave oven. Was it easy to use? difficult? convenient? clumsy? What about the types of utensils needed - easy or difficult to work with?

   How could we prepare more of a meal using the same equipment, this is, only a microwave oven and only a traditional or toaster oven? Is it possible to cook a whole meal in microwave oven without using any other energy source to keep one product warm while you cook the other?

SUGGESTED EXTENDED LEARNINGS:

As time and funds permit, have students plan various types of meals that could be prepared in the mocrowave oven.

1. Each student submit:
   Menu
   Total market order (quantity, size of package and cans, etc.)
   All equipment needed to prepare and serve meal.
   Time schedule for all activities including preparation, serving and clean up.

2. Work in groups to choose the best meal patterns to use for laboratory experiences.
   Determining factors might be - originality, variety, use of previous information on nutrition, realistic time lines.

3. Groups work with teacher in planning which meal patterns will be done in class. Schedule both microwave oven and toaster over and/or oven in foods lab.

4. The same procedures should be considered as used in the initial equipment.

5. After several experiments with both the microwave oven and the conventional or toaster oven, students should be able to evaluate the resources consumed by a family of four.
   Resources consumed
   electrical energy - in cooking
   human energy - time and motion
   electrical energy in storage (freezer and refrigerator)

6. To reinforce the study of consumption of human energy, one or two groups could prepare meals for several days, package for freezer to be heated in microwave oven at later time.

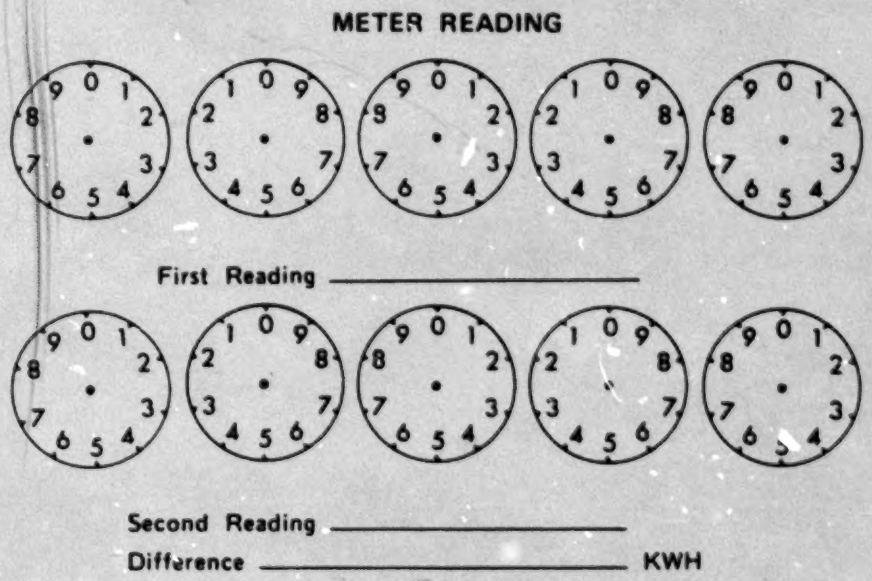
Consider:
1. Time involved in quantity cooking
2. Time involved in preparing for freezer
3. Cost involved in special containers or wrapping for frozen foods.
4. Cost of operating freezer
5. Time and cost of defrosting and cooking frozen foods.
6. Does flavor or texture change with freezing?

LESSON 2

INTRODUCING THE TERM ELECTRICAL ENERGY

CONCEPT: Energy is found in the home in the form of electrical power or housepower.

MATERIALS:
Electric circuit box
Electric power meter (borrow from science lab or local power company)
Small appliances: portable oven, can opener, popcorn popper, toaster, mixer, skillet - any or all
Chart that illustrates how to figure wattage and cost.
"Electricity - What Every Woman Should Know"



NOTE TO TEACHER: The purpose of this lesson is to familiarize the students with what electricity is, how it is measured, how it is used, and what it costs. Since the term "energy" is abstract, the students should have a general understanding of the concept of electrical energy.

PROCEDURE:

1. Study the circuit box - illustrate how it works - both fuses and circuit breakers.

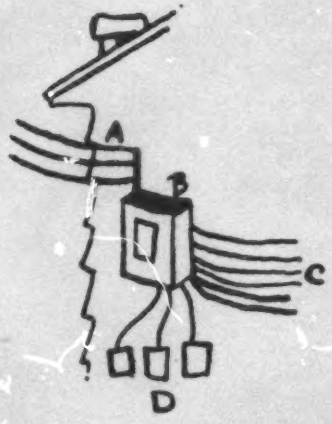
   a. Have students "practice" changing fuses and throwing circuit breaker. (removing and replacing? Why did it go off?)

   b. Know how to tell if your house has <u>low housepower</u> (i.e. is it inadequately wired?)

You can tell that a home is not adequately wired if it has:
"slow" heating appliances
blowing fuses
shrinking TV picture
faltering motors

NOTE: Inadequate wiring costs money -- a 10% DROP in voltage will cause 30% loss of lights or 2% loss of heat. Four out of five homes do not have enough "House Power" today due to increased use of electricity.

What is the cure? See "CURE CHART"



(a) 3 big entrance wires

(b) at least a 100 amp. circuit box

(c) plenty of circuits

... for lighting and general use

... for plug-in appliances

... for large appliances

(d) plenty of convenient outlets, fixed lights and switches

c. Study the chart "How to Identify and use 45 Electric Servants"

NOTE: The average home has 22 appliances and 11 lamps.
1. Have students list appliance and amps rating found in their own homes.
2. From the chart, have students determine the watts involved and find out if they have enough HOUSEPOWER to enjoy them.

d. Now have students figure about HOW MUCH IT COSTS to operate each one.

NOTE: It isn't hard to make a rough estimate of the cost of the operation of an appliance.

You must know three things:

1. Wattage of appliance (see chart)
2. Hours use for a month (your estimate)
3. What you pay per kw hour for electricity.

Wattage x hours use
(per appliance)

			Rate (¢perkwHr)	(Operating cost)
....Watts....Hours		X	...1.2¢	= .....¢
1,000				

Sooooo..you now qualify as a Housepower Expert

because you know.....

- o how to find the main circuit box
- o how to replace a fuse
- o how to tell if your home has low Housepower
- o how to identify and use 45 Electric Servants

and o how your electric bill is figures

Congratulations!

LESSON 3

GASOLINE AND FEEDING THE FAMILY - MARKETING

CONCEPT: Energy is used in various forms by the homemaker.

MATERIALS: Student notebook
Gasoline mileage chart

NOTE TO TEACHER: This unit will be completed in two or three class periods. Essentially it will involve information gathered around the community and in the home.

1. How many trips to the grocery store are made per week?
2. How far do parents have to drive?
3. How many different stores are involved?
4. How close is the nearest store to your home? Is it walking distance?
5. Are there compatable neighbors who live close enough to organize "grocery shopping car pools"?

PROCEDURE: Have students bring from home the following information:

1. How many trips are made to the grocery store each week?
2. How many deliveries of food are made to the home by food vendors - such as milk, bread, etc.?
3. How many miles are involved in weekly grocery shopping?
4. Approximately how many hours are involved in family marketing? (per week)

Have a committee of boys develop a simple chart of "average" miles per gallon on the major automobile models.

Have each student figure the amount of gasoline used for marketing - per week, month, year.

Activity: Have students suggest ways of cutting down the amount of gasoline involved in marketing.

LESSON 4

FUTURES PRESENTATION BY WESTINGHOUSE

CONCEPT: The more efficient use of some resources is the result of technical and marketing improvements.

MATERIALS: Film and cassette presentation by Westinghouse.

NOTE TO TEACHER: This lesson will involve creative thinking and writing - mind stretching at least. Show the film presentation first, answer any questions from students. Have class suggest, teacher write on board, the tasks a mother has to do.

ACTIVITY: Have students project what they think a home communication center might be like in the future. Also describe what a housewife and/or mothers main work center might be like. Consider the tasks a mother has to do.

The main thrust of this activity is to:

1. Really project into the future
2. Consider new and innovative life-styles
3. Dream big dreams
4. Point out ways to do this and conserve energy and keep the environment clean.

EXTENDED LEARNING EXPERIENCE: It would be appropriate for students to make drawings of their design for the future as well as describe it in a narrative. There should be very little assistance from the teacher and students should work independently.

SUMMARY: When the foregoing activity has been completed there should be a class sharing time. The teacher could do this in several ways. "Show and Tell" - "Expo 2000" - "Future Home Show" for a few ideas. Students should be given an opportunity to explain their projects.

Additional Lesson

Students build two model rooms (part of a house) using wood, glass and insulation.

Insulated	Non-insulated

Should be same size, same construction materials.

Exception: One should have insulation on all non-glass walls.

Then set thermometers inside and have student keep reading on differences.
This could be an on-going project.
Models could be moved from sunny place to cooler place, etc.

Question:
1. How much variance in temperature?
2. What does this prove to home owner?
3. What does this mean in terms of electricity use?

Note: Included in the kit will be all the component parts pre-cut with instructions for constructing the two models.

LESSON 5

MICRO-WONDER CUPCAKES

CONCEPT: Convenience foods cooked in microwave ovens are a double saving of energy - time and electrical.

MATERIALS:
Microwave oven
Traditional oven
Mixing bowls
Miscellaneous spoons, measuring cup, rubber scraper
Paper cupcake liners
Muffin tin
Icing mix (optional)

NOTE TO TEACHER: The purpose of this lesson is to introduce the students to time saving devices i.e. cake mix and electrical energy conservation by using microwave oven. Time is a precious, non refundable resource.

PROCEDURE:

1. Explain that this lesson will involve one half of the students using microwave oven and other half traditional ovens to prepare the same product, chocolate cupcakes. Follow instructions on package.

2. When groups have been determined, each team of four should prepare a plan sheet for the laboratory experience of the next day. Include cook, assistant, clean up, evaluator.

   Muffin tins used in conventional oven - paper liners only in microwave oven.

   a. The evaluator will keep accurate time records for preparing and cooking the cupcakes.
   b. The evaluator will compare findings with companion team using a different method.

3. Comparison taste test: break open enough cupcakes so each student will have a taste of cupcakes cooked by both methods.

Question: Let's compare our finished products.
1. Is there a difference in volume or size?
2. Is there a difference in appearance?
3. Is there a difference in texture?
4. Is there a difference in taste?
5. What differences occurred in the amount of time it took to produce the final product?
6. Which product is preferable?

3. During operation, the walls of a microwave oven
   a. are heated to a high temperature
   b. are maintained at a low heat
   c. are not heated at all
   d. alternate between hot and cold

4. A microwave oven operates by electrical energy supplied through
   a. special, heavy-duty electrical circuits
   b. 110-120 volt household current
   c. plugging into a traditional oven
   d. its own high-power battery

5. Microwaves are electromagnetic waves of energy, similar to
   a. earthquake shock waves
   b. household electrical current
   c. low frequency sound waves
   d. high frequency radio and television waves

6. In microwave cooking, energy is converted to heat within the food by
   a. causing rapid movement of molecules of the food
   b. inserting a preheated metal rod into the food
   c. increasing the pressure surrounding the food
   d. bouncing radiation off the surface of the food

7. Food to be cooked in a microwave oven is often
   a. wrapped in aluminum foil
   b. laid on stainless steel cookie sheets
   c. heated on paper dishes or towels
   d. heated in covered metal casserole dishes

8. Microwave cooking differs from conventional cooking because
   a. external heat does not contact the surface of the food
   b. food must be partially cooked before entering the microwave oven
   c. food is wrapped in a special airtight bag before cooking in a microwave oven
   d. microwave cooking is done slowly at a low heat

9. When cooking in a microwave oven
   a. the larger the quantity of food, the longer it will take to cook
   b. the smaller the quantity of food, the longer it will take to cook
   c. cooking time is not related to quantity of food

10. The cost of microwave cooking is
   a. greater than that of conventional cooking
   b. less than that of conventional cooking
   c. about the same as that of conventional cooking
   d. greater for some items and less for others

11. You can tell that a home is not adequantely wired if it has
    a. bad television reception
    b. fuses instead of circuit breakers
    c. "slow" heating appliances
    d. poor insulation

12. The average home has about how many appliances?
    a. 5
    b. 9
    c. 15
    d. 22
    e. 35

13. To figure out the operating cost of an electrical appliance, you must know
    a. how close your house is to a power company line
    b. how many watts the appliance uses
    c. how long the appliance takes to warm up
    d. in what year the appliance was manufactured

14. Which home appliance uses the most energy?
    a. hot water heater
    b. refrigerator
    c. dishwasher
    d. washing machine

15. The main reason people choose to cook in a microwave oven is
    a. the food looks better
    b. the food tastes better
    c. it's faster

16. There is no radiation hazard from a microwave oven because
    a. the waves cannot enter the oven until the door is closed
    b. no radiation is created
    c. radiation is not dangerous to people

17. Microwave cooking is economical because
    a. less expensive cuts of meat can be used
    b. a microwave oven is cheap to purchase
    c. less energy is consumed
    d. there is less shrinkage

18. A microwave oven is easy to clean because
    a. it has a self-cleaning heat cycle
    b. the walls are not heated, so foods don't burn on
    c. it comes with disposable liners
    d. the walls have a glossy enamel finish

19. The nutrients in food are
    a. destroyed by microwave energy
    b. better retained in a microwave oven than a conventional oven
    c. better retained in a conventional oven than a microwave oven
    d. converted to a more usable form by microwave energy

20. Baked goods such as cupcakes can be successfully cooked in a microwave oven; however, they will
    a. have larger air bubbles
    b. not be browned on the top
    c. be sweeter than usual
    d. be cool when they come out of the oven

21. Metal utensils are not used in a microwave oven because
    a. they are too difficult to clean
    b. metal reflects microwave energy and prevents cooking
    c. metal would become dangerously hot in a microwave oven
    d. microwaves cause metal to disintegrate

22. Which of these jobs could be done least successfully in a microwave oven?
    a. baking a potato
    b. heating a sandwich
    c. baking a casserole
    d. toasting a piece of bread